		Means...	Which could in turn be a sign of...	Could this trend be an effect of climate warming?	Could this trend also be contributing to more climate warming in the region?	Could this trend also be contributing to less climate warming in the region?	Other significant effects unrelated to climate warming but related to human health
Higher values of...	**CO2 Fraction**	more CO2 in the atmosphere	Greater carbon emissions by people, less capabilities of carbon sinks such as oceans or forests to be taking in more carbon than they did before	Unlikely	Yes. Carbon dioxide in the atmosphere is a greenhouse gas that traps more re-radiated outgoing solar energy/heat in the atmosphere rather than let it escape back out of the atmosphere.	It depends on the place. Some places may actually get cooler from global warming if global warming contributes to them becoming cloudier and wetter or causes shifts in global wind patterns that bring colder air from polar regions to mid-latitude areas like the continental United States and Europe.	
Lower values of...	**CO2 Fraction**	less CO2 in the atmosphere	Lesser carbon emissions by people, or more capabilities of carbon sinks such as oceans or forests to be taking in more carbon than they did before	Yes, in formerly polar regions covered with ice or permafrost. Warmer air temperatures could lead to greater capabilities for land and ocean areas to function as carbon sinks by creating conditions that makes it possible for greater amounts of vegetation to exist that can take in the carbon dioxide from the atmosphere.	Unlikely	Yes. Less carbon dioxide in the atmosphere means less of a greenhouse effect from it.	
Note of interpretive caution: When examining on a map the distribution of CO2 in the atmosphere over a particular geographical area, keep in mind that CO2 moves quickly through the atmosphere with changing weather, so do not look at the relative levels of CO2 within a geographical area as signifying anything generalizable about how much CO2 there is in one area compared to another in any persisting sense. However, what DOES persist in an area is how much CO2 the people in it emit into the atmosphere and how much of the CO2 then gets taken out of the atmosphere into carbon reservoirs such as plants and oceans. These persisting characteristics are more noticeable on multi-year time series graphs than on maps.							

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Higher values of...	**Aerosol Optical Depth or Deep Blue Aerosol Optical Depth**	More aerosols in the air (also known as particulate matter)	More human induced emissions of particulate matter from motor vehicles, factories, power plants, airplanes, etc, or from volcanic eruptions	Unlikely	Unlikely	Yes. Though they are harmful in large doses to human health, aerosols have the opposite effect on incoming solar radiation than do greenhouse gases. Aerosols scatter and absorb outgoing solar radiation rather than reflect them back to the earth. This is known as the "dimming" effect, which is the opposite of the warming effect from greenhouse gases.	
Lower values of...	**Aerosol Optical Depth or Deep Blue Aerosol Optical Depth**	Less aerosols in the air	Diminishing pollution of particulate matter from human sources or diminishing effects from prior volcanic eruptions	Unlikely	Yes. Less aerosols in the air means less absorption of outgoing longwave radiation, which hence counteracts trapping of heat in the lower atmosphere by greenhouse gases.	No, only if there were human induced sources of the aerosols and the diminishing aerosol trend is paralleled by less carbon dioxide being emitted. These data trends could be evidence that people are taking steps to decrease emissions from sources that emit both greenhouse gases (such as carbon dioxide) and aerosols. Examples would be power plants and motor vehicles, which emit both.	

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Higher values of...	**Total Column Ozone in the Stratosphere (i.e. 10 to 30 miles above the Earth's surface)**	Diminishment of the hole in the ozone layer that exists over certain regions of the world as a result of humans having emitted refrigeration chemicals known as chlorofluorocarbons into the atmosphere before they were banned in an international agreement (The Montreal Protocol). NOTE: data showing levels of ozone will most likely be representing stratospheric ozone in greater quantities than tropospheric ozone when the ozone is above land areas that are not heavily developed by humans. This is because relatively speaking, a larger percentage of total column ozone will be tropospheric only if it derives from the mixing of two human-induced air pollutants (volatile organic compounds and nitrogen oxide gases) with heat.	Lesser amounts of harmful ultraviolet light reaching the Earth's surface, thereby reducing the risk of people getting skin cancer when exposed to the sun.	Unlikely	Unlikely	Unlikely	
Lower values of...	**Total Column Ozone in the Stratosphere (i.e. 10 to 30 miles above the Earth's surface)**	Expansion of the hole in the ozone layer	Greater amounts of harmful ultraviolet light reaching the Earth's surface, thereby increasing the risk of people getting skin cancer when exposed to the sun	Yes. As the troposphere warms from more intensive greenhouse effects, the stratosphere cools. This is because a greater proportion of the outgoing heat energy that would usually go into the stratosphere gets trapped instead in the troposphere due to the greenhouse gases. The resulting colder temperatures in the stratosphere, especially over the Arctic, are leading to a diminishment of the ozone layer. This is because ice clouds in the stratosphere function as a catalytic surface the remaining human-emitted chlorofluorocarbons to break more ozone down.	Unlikely	Unlikely	

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Higher values of...	**Total Column Ozone in the Troposphere (i.e. up to 10 miles above the Earth's surface)**	More ozone in the troposphere, hence more greenhouse gas. In the troposphere, ozone (also known as ground-level ozone) is a greenhouse gas because there it reflects outgoing infra-red radiation back toward the Earth's surface. Tropospheric ozone will be more noticeable over urban areas because it is formed when two human-induced air pollutants (volatile organic compounds and nitrogen oxide gases) mix with heat. Hence, in areas with these pollutants in the air, there would be more ozone on hot days than on cold days.	Greater human induced ozone pollution from motor vehicle emissions and other sources. NOTE: to use this data parameter to identify tropospheric ozone, focus your data examinations primarily around urban areas. Otherwise, interpret the total column ozone data as more of a stratospheric ozone indicator than a tropospheric ozone indicator.	Unlikely	Yes. Ozone in the troposphere is a greenhouse gas that traps more re-radiated outgoing solar energy/heat in the atmosphere rather than letting it escape back out into space.	Unlikely	
Lower values of...	**Total Column Ozone in the Troposphere (i.e. up to 10 miles above the Earth's surface)**	Less ozone in the troposphere, hence less greenhouse gas.	Lesser carbon emissions by people and/or more capabilities of carbon sinks such as oceans or forests to be taking in more carbon than they did before. NOTE: to use this data parameter to identify tropospheric ozone, focus your data examinations primarily around urban areas. Otherwise, interpret the total column ozone data as more of a stratospheric ozone indicator than a tropospheric	Unlikely	Unlikely	Yes. Less ozone in the troposphere means less of a greenhouse effect from it.	

			ozone indicator.				

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Higher values of...	**Mass Concentration**	More aerosols in the atmosphere. Aerosols are "solid or liquid particles having diameters in the region of 0.001 to 10 microns (millionth of a metre), and include dust, soot, sea salt crystals, spores, bacteria, viruses and a plethora of other microscopic particles, which may be natural or man-made...Collectively, they are often regarded as air pollution, but many of the aerosols have a natural origin)." (http://www.weather-climate.org.uk/03.php).	Increased dust storms, volcanic eruptions, or pollutants being emitted into the air from human sources such as automobiles and power plants.	Yes, indirectly, if the increased aerosol is the result of people burning more fossil fuels in cars and power plants in order to to run their air conditioners more on the increasingly warmer days that come with climate change.	Unlikely, unless the increased aerosols exist in certain types of clouds, and scientists discover that the existence of those aerosols in those those types of clouds are doing more absorbing than reflecting of solar radiation. The reflective and absorptive properties of aerosols are still not fully understood by scientists, especially in clouds, where aerosols coexist with water vapor. There are many different types and properties of clouds and aerosols behave differently depending on which clouds.	Yes. In most but not all situations, aerosols do more reflecting than absorbing of solar radiation, so in these cases, more aerosols in the atmosphere means more solar radiation reflected back into space and less is retained in the atmosphere as heat.	The inhaling of aerosols can be bad for our respiratory systems, causing medical problems. This is particularly true for acidic aerosols like SO2 and NO2.
Lower values of...	**Mass Concentration**	Less aerosols in the atmosphere	Decreased dust storms, volcanic eruptions, or pollutants being emitted into the air from human sources such as automobiles and power plants.	Generally not. Aerosols in the atmosphere increase when there are dust storms, volcanic eruptions, or pollutants being emitted into the air from human sources such as automobiles and power plants.	Yes. When there are fewer aerosols in the air there are fewer gases to reflect solar radiation back into space. Hence, more radiation reaches the surface and stays trapped in the atmosphere by greenhouse gases.	No. In most but not all situations, aerosols do more reflecting than absorbing of solar radiation, so in these cases, less aerosols in the atmosphere means less solar radiation reflected back into space and more retained in the atmosphere as heat.	

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Higher values of...	**Methane**	More methane in the atmosphere	Increased emissions of methane from land surface events such as biomass fires; increased populations of methane-emitting animals such as cattle, increased release of methane from warming land surfaces, particularly permafrost; and increased releases of methane in gas form from clathrates, which are solid-methane materials found in some parts of the ocean.	Yes. Warming air temperatures lead to warmer surfaces which then emit more methane. An example would be the warming of previously frozen landscapes (permafrost). It is possible in the future that increased warming of cold and deep parts of the ocean could also lead to noticeably greater emissions of gaseous methane from the clathrates found in these places.	Yes, but only temporarily. Methane is a powerful greenhouse gas, much more powerful than carbon dioxide (for example). However methane quickly breaks down (oxidizes) in the atmosphere, so unless there was a dramatic and sustained increase of methane (such as constantly-burning biomass fires), there would not be any long-lasting greenhouse effect. However, because methane oxidizes to CO2, methane release can have longer-term climate effects.	No	
Lower values of...	**Methane**	Less methane in the atmosphere	Fewer emissions of methane from land surfaces or from the ocean.	No.	No		

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Higher values of...	**Carbon Monoxide**	More carbon monoxide in the atmosphere	More combustion from the burning of biomass on or near the Earth's surface	No. Carbon monoxide absorbs infrared radiation just like carbon dioxide, water vapor, methane and other gases that we call greenhouse gases, but because CO molecules are short-lived in the atmosphere, scientists do not generally consider them to have an influence on global warming. Therefore, neither greater or lesser amounts have a direct relationship to climate warming. However, there may be an indirect relationship. Carbon monoxide levels in the atmosphere increase with fires and fires are more likely to occur more frequently on surfaces that are getting warmer and drier due to climate warming.	Perhaps, but not by much. Carbon dioxide is a much bigger contributor to long-term global warming than is carbon monoxide, so smaller amounts of carbon monoxide in the atmosphere are unlikely to make much of a contribution to reversing climate warming in the long term.		The inhaling of carbon monoxide can severely damage the human respiratory system.
Lower values of...	**Carbon Monoxide**	Less carbon monoxide in the atmosphere	Less combustion from the burning of biomass on or near the Earth's surface	No	No		

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Higher values of...	**Nitrogen dioxide**	More nitrogen dioxide in the atmosphere	More combustion from the burning of biomass on or near the Earth's surface or more fossil fuel burning, particularly of coal.	Only indirectly. If warmer temperatures are causing people to use more power to keep cool, and the source of the power is greater combustion from cars or from fossil fuel-burning power plants,the result could be increased nitrogen dioxide in the atmosphere.	Yes. Nitrogen dioxide reacts with other pollutants (nitrogen oxides and volatile organic compounds) and sunlight to produce ozone in the troposhere, which (unlike ozone in the stratosphere) is a greenhouse gas.	No	The inhaling of nitrogen dioxide can severely damage the human respiratory system.
Lower values of...	**Nitrogen dioxide**	Less nitrogen dioxide in the atmosphere	Less combustion from the burning of biomass on or near the Earth's surface, or less burning of fossil fuels.	No	No	Yes, but indirectly. Less nitrogen dioxide in the air means less production of tropospheric ozone, a greenhouse gas.	

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Higher values of...	**Sulfur dioxide**	More sulfur dioxide in the atmosphere	More combustion from the burning of biomass on or near the Earth's surface; increased burning of sulfur-rich fossil fuels without emissions controls; higher volcanic activity.	Yes, indirectly, if the increases in sulfur dioxide are the result of people burning more fossil fuels in cars and power plants in order to run their air conditioners more on the increasingly warmer days that come with climate change	No.	Yes. More sulfur dioxide in the atmosphere means more solar radiation is being reflected back into space and less is being retained in the atmosphere as heat.	Like other aerosols, sulphur dioxide can damage the human respiratory system. It also contributes to acid rain, which harms the animals and plants that live in rivers and lakes.
Lower values of...	**Sulfur dioxide**	Less sulfur dioxide in the atmosphere	Less combustion from the burning of biomass on or near the Earth's surface; decreased fossil fuel burning; decreased volcanic activity.	No	Yes. More sulfur dioxide in the atmosphere means more solar radiation is being reflected back into space and less is being retained in the atmosphere as heat.	No. Less sulfur dioxide in the atmosphere means less solar radiation is being reflected back into space and more retained in the atmosphere as heat.	